E40 "Digital Stringing" — The Practicality and Legitimacy of Determining the Area of Origin (AO) of an Impact Event From 3D Scans Recorded Via Structured Light Scanning

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After attending this presentation, attendees will be made aware of the possibility, practicality, and potential advantages of determining the AO through "digital stringing" from Blood Pattern Analysis (BPA) of a simulated impact event captured via structured light scanning.

This presentation will impact the forensic science community by providing an investigation of the possibility and capabilities of determining the AO of impact events using digitally captured 3D scans. Such a technique may prove useful in reconstructing impact events by providing a 3D representation of the AO, re-evaluating/verifying AO calculations, and/or providing the possibility of calculating the AO of a previously recorded BPA event that may not have been performed *in situ* during initial scene processing.

Multiple impact events were created by a third party using laboratory materials, including animal blood and various blunt instruments, in an enclosed space with white walls. The purpose of using such instruments was to simulate the blood spatter that may occur as a result of blunt force trauma, as opposed to sharp force trauma, high-velocity blood spatter (i.e., gunshots), and/or arterial spurts. After the impact events were simulated, a full 3D scan of the area was performed using a 4D Dynamics Real 3D Scanning Solutions PicoScan, structured light scanner with a Canon® EOS® 1000 D/Rebel XS camera equipped with an 18mm-55 mm zoom lens and an 800 x 600 resolution pico projector, to record the spatter. Following the scan, *in situ* stringing was performed and photographed by to record each impact event. Additionally, each individual impact spatter used for AO determination during the *in situ* stringing was documented. This was done in order to insure that the same spatter droplets were used while "digitally stringing" the AO of each event.

Inspired by the 'digital stringing' capabilities of the FARO® SCENE software, using 3D images captured via the Pico Scanner, attempts were made to string the events digitally.[1] Upon completion, the AO of the 3D scans of the impact events that were strung digitally were compared with the images taken of the AO that were strung *in situ*. Additionally, all impact angles calculated during the *in situ* stringing and "digital stringing" were compared.

The results were compared in order to determine the legitimacy and efficacy of using digital scans in order to accurately determine and represent the angle of origin of a series of impact events. While determining the AO of impact spatter is in itself an estimation, it is hypothesized that with accurate, highly detailed, 3D digital scans of a series of impact events, the AO of each event can be estimated digitally to the same standards as if it were done *in situ*. Furthermore, it is hypothesized that by providing a 3D representation of the AO to a jury, a better understanding of the impact events and the overall scene will be achieved.

Reference(s):

1. SCENE 6.0. FARO® Lake Mary, Florida, USA, 2016, software available at http://www.faro.com/products/faro-software/scene/free-trial#Download.

Digital Stringing, Blood Spatter, 3D Scan